National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

November 7, 2005

Reply to Attn of 420

TO: NASA Headquarters
Attn: Associate Administrator for Science Mission Directorate

FROM: 100/Director

SUBJECT: Glory Mission Confirmation Readiness Review (MCRR) Findings

The Goddard Program Management Council, chaired by the Deputy Director, Christopher J. Scolese, conducted the Glory MCRR on September 23, 2005. The review included a Science Overview, Mission and Programmatic Overview, Independent Confirmation Assessment Team Report, Resource Analysis Office (RAO) Report and EOS Program Office assessment and recommendations. There were no actions from this review.

During the MCRR it was noted that the Glory mission considerably reduced risk during formulation by re-use and re-qualification of the spacecraft bus originally built for the VCL mission, re-use of the Total Irradiance Monitor sensor using the Solar Radiation and Climate Experiment design and drawings, and the development of the Aerosol Polarimetry Sensor based on the Research Scanning Polarimeter, a successful airborne instrument. The Goddard Space Flight Center (GSFC) System Management Office conducted a NPG 7120.5C audit of the Glory project and found the project to be in compliance. The Glory mission budget contains 25 percent reserves on cost to go.

The Glory project's budget has been independently reviewed by both Aerospace Corporation and the GSFC/RAO. The Glory total cost fell at the 90 percent and 59 percent confidence level on the respective "S" curves and is deemed consistent with both estimates. GSFC notes that if Headquarters wishes to be as conservative as the RAO 70 percent confidence level estimate, an additional $22M in Allowance for Program Adjustment should be reserved.

GSFC recommends that the Glory mission be confirmed for implementation with a launch readiness date of December 2008 and a total cost of $247M, under UPN 810/PN 387055, exclusive of corporate G&A and other Headquarters charges.

Edward J. Weiler

cc:
100/Mr. Ryschkewitsch
100/Mr. Scolese
300/Ms. Harper
400/Mr. Obenschain
420/Mr. Scheve
420.2/Mr. Burg
500/Mr. Figueroa
HQ/Mission and Systems Management Division/Mr. Luther
HQ/Sun-Earth System Division/Mr. Fisher
HQ/Sun-Earth System Division/Mr. Gay
HQ/Sun-Earth System Division /Mr. Hooker

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

DEC 13 2005

Reply to Attn of SMD/Earth-Sun System Division

TO: Goddard Space Flight Center
Attn: Director

FROM: Associate Administrator for Science Mission Directorate

SUBJECT: Authorization to Proceed with Implementation for the Glory Mission

The Science Mission Directorate Program Management Council (PMC) met on November 7, 2005, to conduct the confirmation review for the Glory mission. Based on the deliberations of the PMC, the Glory mission is confirmed. The Glory project is authorized to proceed with the Implementation phase in accordance with the plan presented to the PMC.

This authorization is consistent with commitments in the Glory Level 1 Requirements, including a total cost to NASA not to exceed $247M and launch readiness expected in December 2008.

I commend the Glory team members for their achievements to date and excellent use of the formulation phase to mitigate risk. My appreciation is extended to the Integrated Independent Review Team's outstanding assessment of, and guidance to, the Project throughout the process. Enclosed are the minutes of the PMC meeting, including action items, for your reference.

If there are any questions regarding this letter or the minutes from the PMC meeting, please contact Mr. Ronald Hooker, the Program Executive for the Glory project, at (202) 358-4508.

I look forward to a successful Glory mission.

for Mary L. Cleave

Enclosure

cc:

Science Mission Directorate/Dr. Colleen Hartman
- Mr. Mike Luther
- Dr. Paul Hertz

Earth-Sun System Division/Dr. Richard Fisher
- Mr. Charles Gay
- Dr. Jack Kaye
- Mr. Ron Birk

Mission and System Management Division/Mr. Ken Ledbetter
- Mr. Theodore Hammer
- Mr. Steve Neeck
- Mr. Ronald Hooker

Universe Division/Dr. Anne Kinney

Business Management Division/Mr. Roy Maizel
- Ms. Joan Haas

Solar System Division/Mr. Andrew Dantzler

Goddard Space Flight Center
- Dr. Franco Einaudi
- Mr. Rick Obenschain
- Mr. David Scheve
- Dr. Richard Burg

Minutes of the Program Management Council (PMC) Meeting
for the

Glory Mission Confirmation Review (MCR)
conducted

November 7, 2005 at NASA Headquarters

Purpose: The purpose of the PMC meeting was to assess the performance of the Glory Project at the completion of the Formulation phase, and to ascertain the readiness of the Project to proceed into Implementation.

I. Executive Summary

The Program Executive, Program Scientist, Project Scientist, Project Formulation Manager and Integrated Independent Review Team (IIRT) Chair each presented to the NASA Science Mission Directorate (SMD) PMC, chaired by Mr. Mike Luther.

The PMC agreed to recommend confirmation of the Glory Project to proceed with implementation.

During the review and discussion, the following four action items were generated:

1. Provide to the PMC a description of the current plan for the flight of the APS-type instrument and the TIM-type instrument on the National Polar Orbiting Environmental Satellite System (NPOESS).
2. Provide to the PMC a statement that addresses the impact of a temporal gap in total solar irradiance (TSI) data. It is understood the impact will be a function of the year and whether the gap occurs during solar minimum.
3. Provide Mr. Ken Ledbetter with information on the mission's single point failure risks and the 7120.5C Compliance Matrix. (The 7120.5C compliance audit results presented by Code 170 to the Center PMC had been provided to Mr. Ledbetter previously.)
4. Provide to Mr. Phil Napala with details of the system bus reliability calculations.

In closing, several members of the PMC encouraged the Project not only to monitor closely the APS contractor, Raytheon, but also to communicate periodically with GSFC and Headquarters PMC's to report on both positive and negative activities.

Details of the discussion appear in Section III.

II. Attendees

Program Management Council Chair: Mr. Mike Luther

Program Management Council Members:
Mr. Ken Ledbetter, Mr. Chuck Gay (for Dr. Richard Fisher), Dr. Anne Kinney, Mr. Phil Napala, Mr. Andrew Dantzler, Ms. Nancy Porter (for Mr. Roy Maizel)

Special Guests

Dr. Mary Cleave	Associate Administrator, SMD
Dr. Colleen Hartman	Deputy Associate Administrator, SMD

Ex-Officio Members

Mr. George Baker	SOMD
Mr. Chris Scolese	OCE
Dolores Beasley	PAO

Presenters:

Ron Hooker	SMD
Hal Maring	SMD
Michael Mishchenko	GSFC GISS
Richard Burg	GSFC/420
Richard Ho	GSFC/301

Attendees:

Martha Maiden	SMD ESSD	Jaya Bajpayee	GSFC
DeVon Carroll	OER	Garrett Skrobot	KSC
Bernie Seery	GSFC/600	Anne Sweet	SMD
David Scheve	GSFC/420	Greg Williams	SMD
George Morrow	GSFC/400	Chuck Miller	SMD
Tim Dunfee	GSFC/420	Willis Jenkins	SMD
Larry Travis	GSFC/GISS	Patrick Martin	OSMA
Carey Lively	GSFC/500	Theodore Hammer	SMD
Lynn Westine	GSFC/420	Dr. Edward Weiler	GSFC/100

III. PMC Discussion Details

Opening Comments:

The Chair opened the PMC meeting with an explanation of the purpose of the review and the process that will be followed. The Chair acknowledged the Project's long and challenging road and recognized that the meeting participants' knowledge of the Project varied. Finally, the Chair strongly encouraged the PMC members and audience to openly and actively participate in the review and to ask any questions.

All meeting attendees introduced themselves.

Project Overview

The Glory Program Executive, Mr. Ron Hooker began by noting that the Glory mission plays an integral role in fulfilling two separate but synergistic Earth science mission requirements:

- Glory answers the Administration's challenge as set forth in the FY04 President's Budget calling for the accelerated development and launch of an advanced polarimeter – realized with the Aerosol Polarimetry Sensor (APS) – to increase our understanding of black carbon soot and other aerosols as causes of climate change; and,
- Glory provides, via its Total Irradiance Monitor (TIM) instrument, measurement continuity of the important TSI data record. Glory addresses the 1994 National Academy of Science Report finding, *"One activity ranks above all others for determining solar influence on global change: Monitor the total and spectral irradiance from an uninterrupted series of spacecraft radiometers employing in-flight sensitivity tracking."* Glory acts as a gap-filler for the decades-long TSI data record, which is in danger of disruption with the end of the SORCE mission life in 2008, and prior to the commencement of the NPOESS era measurements.

Mr. Hooker provided a summary of the mission's formulation history and highlights of the Glory Project, mission elements, and NASA categorization status. Mr. Hooker stated that the implementing Center is committing to a $247M not-to-exceed budget, and a December 2008 launch readiness date (LRD). He noted that Glory is a pathfinder for the NPOESS era measurements of aerosols and total solar irradiance.

Dr. Colleen Hartman and Mr. Mike Luther asked on which satellites were the NPOESS instruments planned. Dr. Richard Burg responded that the TIM was originally planned for the 0630 (terminator) orbit, believed to be the C3 craft; and, the APS was slated for the 0930 orbit, originally the C1 craft, though there was confusion over whether the NPOESS Integrated Program Office (IPO) may be changing the planned manifests for both instruments (e.g APS may be moved to C4). Mr. Luther asked if the Glory APS accelerated the NPOESS measurements, or was it a risk reduction for the NPOESS APS development; Dr. Burg responded that it acted as both. Further, Dr. Burg indicated that with a gap in development activities between Glory and NPOESS there is the opportunity to incorporate lessons learned. In addition, algorithms will have been developed and exercised. On the other hand, Dr. Burg noted that time is a critical issue for TIM due to the importance of overlapping instrument measurements from different missions. Dr. Hartman requested the Project provide an understanding of the NPOESS APS and TIM flight plans (i.e., what was promised), and the impact of a gap in the TIM data. (Reference Action Items 1 and 2.)

Mr. Hooker presented the status of the critical formulation phase products as identified in the SMD Handbook, and the additional requirements satisfied appearing in the Glory Formulation Authorization Document (FAD). He noted that as a requirement of the FAD the external science approach had been coordinated with Headquarters, including the provision of a consistent budget profile. The only incomplete requirement was final approval of the Level 1 Requirements document, which was in the signature cycle.

Mr. Hooker continued by identifying the key features of the Glory mission including the plans to launch on a Taurus XL launch vehicle, and fly in an A-Train orbit between the Parasol and Aura missions. Mr. Luther asked for an explanation of the 5-year goal. Dr. Burg indicated that the Level 1 requirements and contract cite a 3-year mission life, but that the *Science and Mission Requirements Document (SMRD)* Level 2 requirements cite the 5-year goal. Further, he explained that the expendable elements are designed to meet a 5-year mission goal. Mr. Hooker finished by identifying the mission team members: GSFC for project management and systems engineering; GSFC/GISS, for APS science operations, and home of the Project Scientist; KSC for launch services; Orbital Sciences Corporation, supplier of the spacecraft bus, system integration and test, and the mission operations center; Raytheon for the APS instrument; and, Laboratory for Atmospheric and Space Physics (LASP), University of Colorado, for the TIM instrument and TIM science operations.

Mr. Greg Williams asked if NASA owns the contract with Raytheon and whether there were relationships with Northrup Grumman [the NPOESS systems integrator]. Mr. Hooker responded that NASA owns the contract with Raytheon. The decision was tied to the Headquarters strategy of meeting the accelerated mission directive by eliminating external dependencies. The NASA decision to procure the instrument directly from Raytheon rather than go through NPOESS IPO was part of that strategy.

Program Scientist

The Program Scientist, Dr. Hal Maring, gave a broad overview of the science and the importance of the aerosol data and the total solar irradiance measurements and impact on our understanding the climate forcings. Dr. Maring noted that the Glory mission provides two independent measurements that both contribute to climate science. He indicated that the aerosols and clouds have numerous effects with high uncertainty and that the uncertainty is of the same magnitude of the greenhouse gases - the APS instrument will provide data that will be used to reduce the uncertainty. In addition, Dr. Maring noted that the second instrument, the total solar irradiance (TSI) monitor will provide continued measurements that are critical to determining the Sun's effect on the Earth's climate, and to a better understanding of the variability in the output of energy from the Sun.

Science Overview

The Project Scientist, Dr. Michael Mishchenko, provided a description of the large uncertainties in understanding the climate forcings. He indicated that the data from the Aerosol Polarimetry Sensor (APS) will assist scientists in understanding and modeling the climate-relevant chemical, microphysical, and optical properties and spatial and temporal distributions of human-caused and naturally occurring aerosols.

The high-level slide on the Glory Mission science objectives [page 17] generated much discussion, especially from Drs. Hartman and Weiler. The PMC recommended the Project use the Science Summary slide [page 34] when describing the Science Objectives: *"Reduce the uncertainty of the effective climate forcings by: increasing our understanding of aerosols and their impact on climate change, and extending the baseline total solar irradiance measurements."* It was widely agreed in the meeting that allocation of aerosol impact on climate to natural versus anthropogenic causes should be viewed as a research goal to which Glory can make an important contribution. It is not, however, a deliverable insofar as the Glory mission is concerned.

Dr. Mishchenko addressed the hierarchy of existing/planned instruments and noted that the measurement approach for Glory will use multi-angle multi-spectral polarimetric measurements. Mr. Luther asked whether POLDER provided these types of measurements. Drs. Mishchenko and Burg indicated that these measurements (from Glory APS) are not exactly the same; there are differences in knowing the polarization, and simultaneously measuring different particle types. They also noted that the POLDER instrument is currently being flown on Parasol. Mr. Hooker added that POLDER measurements offer only sequential polarization measurements, as a consequence of the filter wheel design; Glory APS will provide simultaneous polarization measurements – thereby improving polarization accuracy.

Dr. Mishchenko continued by describing the measurement objectives and the retrieval requirements, including measuring the aerosol variability and polarization. Dr. Weiler indicated that polarization analysis is tough and can be costly; he questioned whether there is enough money. Dr. Mishchenko indicated that there was sufficient funding for Science. He continued by addressing the aerosol single-scattering albedo (SSA) and the use of sun glint measurements.

Dr. Mishchenko indicated that although Glory is a self-contained mission, the Project decided to include a Cloud Camera (similar to CALIPSO's wide field camera) to increase the quantity of usable data, as some visible clouds can be in the field of view and need to be identified. Mr. Ledbetter and Mr. Luther asked whether the Cloud Camera is considered an instrument. Drs. Mishchenko and Burg and Mr. Hooker indicated that the Cloud Camera is not considered to be a separate instrument on Glory and that the APS can perform the functions itself; however the Cloud Camera significantly increases the amount of useful data. Dr. Hartman noted that the Cloud Camera is needed to mitigate

the hard problem of registration to support APS measurements. Mr. Ledbetter indicated that it should appear in the descope list; he confirmed that it was indeed there. Further, Dr. Weiler noted that the cost of this concern is less than $1.5M. Dr. Burg also indicated that Glory will be in the A-Train and that MODIS can act as a cloud camera. The PMC asked if the observations needed to be simultaneous, and were told that they needed to be 'near simultaneous'. Mr. Ledbetter asked if more operational constraints would be required, Dr. Burg indicated yes they would.

Dr. Mishchenko continued and addressed the calibration (polarization and radiometric) and validation approaches. Dr. Hartman asked if the validation activities were covered by the Glory Budget. Dr. Maring confirmed that the Project has funds to: fly the Research Scanning Polarimeter (RSP) on small survey aircraft to refine the RSP algorithms; obtain data from high altitude aircraft to address the issue of simultaneous retrievals; and, participate in multi-institutional field campaigns to cross-validate with ground-based, aircraft, and satellite instruments.

Dr. Mishchenko presented the basis of the Total Solar Irradiance measurements and emphasized the criticality of continuous and overlapping measurements, especially as the measurements can be combined into a composite representation. Dr. Hartman asked whether there are other missions or mechanisms to gather TSI measurements. Dr. Mishchenko indicated that there are no other known missions capable of gathering the data. Dr. Burg reinforced that launching in 2008, during solar minimum and overlapping with SORCE, is important. He noted that there is a 6-month overlap needed for cross-calibration. Dr. Hartman asked the Project to provide a description of the impact if there is a gap [if the NPOESS launch is delayed]. (Reference Action Item 2.) Mr. Luther reconfirmed there may be a true gap.

Dr. Mishchenko addressed the TIM requirements and compared them to SORCE. Dr. Hartman asked for an idea of how much uncertainty can be beaten down; Dr. Mishchenko indicated that the total uncertainty can be reduced by a factor of 3-4 – which can be meaningful to policy makers.

Ms. Martha Maiden questioned the TIM accuracy requirements in the Level 1 document. Dr. Burg clarified that the Level 1 requirements direct that Glory will provide data with the same or better accuracy as SORCE (350ppm), but that the Level 2 requirement is actually three times better (100ppm). Further, he indicated that this increase will be due to small changes in the absorbing cones and that the accuracy will be validated once on orbit. Dr. Burg noted that the Project has received sufficient number of cones for flight and that there is no additional risk to the program.

Dr. Mishchenko discussed the Science Team members and noted that a Science Working Group would be established through a formal Call for Proposals, as part of the Research Opportunity in Space and Earth Science (ROSES) in FY08. Dr. Anne Kinney questioned whether there was sufficient Science Budget included in the Glory Budget. Dr. Burg

indicated that there was and that one of the recommendations from the GSFC Red Team Cost Review was to add money for Science and that the Project accepted and incorporated the recommendation. Dr. Kinney noted that many projects do not have sufficient funding for Science; Dr. Burg confirmed that he appreciates the importance of the continued science support and that there is sufficient funding. Mr. Hooker noted that in response to concerns by Dr. Cleave, the Project coordinated Science budget with Dr. Kay. Dr. Burg indicated that in response to a recommendation from Dr. Kay, the Science budget had been augmented $9M for external science team post-launch activities.

Dr. Mishchenko completed his presentation on the Science by addressing the Public Engagement activities and the Science Summary.

Mission Implementation

Dr. Richard Burg addressed elements in the Mission Implementation. Dr. Burg noted that the significant events were as expected, with the exception of the GSFC Independent Cost Review. Dr. Hartman noted that the 'Independent' review was performed by a GSFC Red Team; the Recommendation to change the reference to Red Team was accepted.

Dr. Burg reviewed the key baseline and minimum mission requirements and the mission elements. He noted that the difference between the SORCE and Glory TIM instrument is primarily the TIM Pointing Platform (TPS) and that this will also be the case for NPOESS. Dr. Burg described in detail the bus heritage. Dr. Hartman asked for the number of problems that 9 satellites with the same STEP bus heritage have experienced. Dr. Burg indicated that there are no known problems. Mr. Luther asked about the reference to ACRIMSAT bus being heritage – given that it is a spinner. Dr. Burg responded that there is similar bus architecture, with the exception of the ACS. Mr. Luther asked whether Glory is making any assumptions or relying on heritage throughout the development and integration phases. Dr. Burg indicated that there are no assumptions made and that there was no reliance on 'heritage' and that the 'heritage' was not used to take any "shortcuts". Further, he addressed the Project component audits, the performance baseline testing and the steps taken to establish the baseline. Dr. Burg indicated that the bus was assessed for compatibility with Glory's functional, operational and environmental requirements. Mr. Ledbetter reviewed the process [on page 42] that the Project went through in establishing the bus baseline.

Dr. Burg proceeded to provide a high-level summary of the TIM and the APS instruments, the cloud camera and the ground system. Dr. Hartman questioned whether Glory was getting the support from Raytheon/SBRS that was needed. Dr. Burg indicated that 'SBRS Resources' was Glory's top risk. The PMC asked how much Raytheon/SBRS had underrun; Dr. Burg responded that they had underrun cumulatively a couple of million dollars. Dr. Burg further indicated that the resource issue has eased up due to: 1) a restructured VIIRS program; 2) a cancelled project in El Segundo that

enabled some engineers to relocate to Santa Barbara; and 3) an increase in on-site Glory Project representation. Dr. Hartman asked how frequently the Glory team is visiting SBRS. Dr. Burg indicated that there are regular visits, for example, he would be out there this Thursday; he also indicated the Project has an on-site engineer with a business background. Dr. Hartman asked who else was there; Dr. Burg indicated that there is a Sr. Systems Engineer, Dr. Ed Russell and a Sr. Electrical Engineer who built the RSP [Dick Chandros].

Dr. Burg continued with a brief description of the Taurus XL launch vehicle.

Dr. Burg identified key players involved with the Glory mission and presented a project organization chart. He walked the PMC through the Master Schedule. Mr. Mike Luther asked if everything was funded. Dr. Burg responded that it was. Mr. Luther reiterated that the APS delivery was 12/07 and that I&T was one year prior.

Dr. Burg presented the resource summary and noted that the power calculation includes the added body-mounted solar panel, and the significant mass margin calculation is based on a Taurus XL launch vehicle.

Dr. Burg noted that Glory is compliant with 7120.5C, the GSFC Golden Rules and ITAR. Mr. Ledbetter asked about foreign partners. Dr. Burg indicated that: 1) there are no foreign partnerships; 2) there are some foreign scientists, but that appropriate safeguards have been made; and 3) the only major foreign component is a star tracker procured by Orbital Sciences.

Dr. Burg reviewed the Risk Summary and discusses the top Glory risks. He indicated that there was discussion about the launch vehicle flight loads risk. Mr. Luther asked whether Glory is committed to a softride. Dr. Burg indicated that it is baselined in the launch vehicle contract. Mr. Ledbetter questioned the 'SPF Status' risk. Dr. Burg indicated that they are mostly in the power system. Mr. Ledbetter asked for a list of the SPFs. (Refer to Action Item 3.)

Dr. Burg discussed the overall cost estimation process, the key assumptions and the WBS cost elements. He reviewed the Mission Baseline Costs (PN 387 055) and noted the line that indicates continued Science funding. Dr. Kinney asked if there were adequate funds for algorithm development. Mr. Hooker responded that appropriate budget line was fully vetted with Drs. Kay and Maring, Mr. Hammer, and Ms. Joan Haas. Further, Drs. Burg and Mishchenko added that the guest investigator was funded. Mr. Ledbetter asked where traditional Mission Ops and Data Analysis appeared in the WBS; Dr. Burg indicated in WBS element 4. Mr. Luther asked for actual FY05 APS costs; Mr. Tim Dunfee responded that about $11-12M have been spent and that the Project carried over $19M [due to directed budget irregularities]. Mr. Luther asked if the numbers in the Contingency cost element included the 5 months. Dr. Burg indicated yes, they are

included. He further clarified that Glory doesn't need the full $25M in the 5 months, but that the 5 months are included.

Mr. Luther asked about the monthly spend rate. Dr. Burg indicated that during Observatory I&T, the monthly spend rate will be about $2M. He added that at the projected time when APS might slip, Glory will have fewer people and the TIM instrument will have been delivered. The Project's contingency planning accommodates a 'stand-down' in the event SBRS delivers APS late.

Dr. Burg reviewed the descope options and explained the Glory cost comparisons with the GSFC Resources Analysis Office (RAO) and Aerospace Corporation's Independent Cost Estimate (ICE) prepared for Headquarters. Mr. Hooker indicated that Mr. Claude Freaner reviewed both estimates and concluded the Project cost estimate was a reasonable estimate for the mission described. A copy of Mr. Freanor's written statement, provided to Mr. Luther and Mr. Ledbetter, is attached.

IIRT Assessment

Mr. Richard Ho presented on behalf of himself and Dr. Frank Martin (IIRT Co-Chair). Mr. Ho provided a brief background of the Glory Project, a history of the Systems Reviews, a list of Review Team members, a general assessment, and a list of significant Mission PDR Requests for Action (RFAs). Mr. Ho presented an independent assessment of the Glory management processes and list of Mission PDR risks. Mr. Luther asked whether anything was being done to address the 'Yellow' Staffing Risk related to the DPM and Observatory Manager positions; Dr. Burg indicated that interviews were on-going and that they hoped to have the positions filled quickly.

Mr. Luther asked for additional information with respect to what the Project is doing to mitigate the risks at SBRS. Dr. Burg indicated the Project is: 1) Building a number of optical brassboards for risk reduction, including brassboards for the telescope assembly; 2) Building a number of electronics brassboards for the digital and analog signal processors; and 3) Procuring an EDU for the scan mirror motor. Mr. Luther asked when the Project expects to see real data through the flight instrument for the first time. Dr. Burg indicated that performance data from the electronics and the telescope is expected prior to CDR. The Project's test philosophy is to test at the lowest assembly level. As planned, the polarimeter and electronics modules come together at I&T. However, Dr. Burg also noted that once the polarimeter module is built the assembly can be tested through the pre-existing Research Scanning Polarimeter (RSP) electronics, which facilitates early problem identification.

Mr. Luther asked whether there is staffing carryover at LASP. Dr. Burg indicated that there was. Mr. Ho re-iterated that he was on the Review Team for SORCE and sees the same faces on Glory.

Mr. Ledbetter asked for a list of waivers. Dr. Burg responded that there are no waivers requested. Mr. Ledbetter asked about EVM. Mr. Hooker read the assessment from Code 170. Mr. Ledbetter asked for a copy of the 7120.5C compliance matrix and the report from Code 170. (Reference Action Item 3.)

GSFC Recommendation

Dr. Ed Weiler noted that the GSFC PMC reviewed the readiness of Glory to proceed to implementation on 9/23/05 and that GSFC recommended confirmation. A copy of the Glory Mission Confirmation Readiness Review (MCRR) Findings was delivered at the SMD PMC [copy attached]. Dr. Weiler added that there is one caveat in that the RAO estimate is a good tool, and appears to indicate an additional $10-20M cost risk based on "reality", like budget changes, and other external forces. Mr. Luther agreed with Dr. Weiler's comments and noted that RAO numbers are fair; he added that the numbers are good indicators, but that the budget should not be made to the RAO numbers.

PMC Discussion

1. Dr. Anne Kinney was confused about the role of the cloud camera. Dr. Burg noted that the cloud camera was added early in the formulation study phase; it was not included initially but as the stand-alone analysis continued, it was added. As an instrument of opportunity it was not included. VIIRS could act as a cloud camera if APS was on NPOESS. Recommended confirmation.
2. Mr. Ledbetter noted that the Project has done a lot of good work but that he was concerned that the Level 1 Requirements document was not yet signed. He recommended the Project go forward, contingent on getting the signatures.
3. Mr. Ledbetter noted that some aspects of the re-use of existing hardware were reminiscent of the Phoenix project and recommended the Project talk to Karen McBride. However, he noted that the Project has done the right steps in: performing detailed audits, validating the as-built configurations, reviewing GIDEPs, completing performance testing and assessing the compatibility with Glory's functional, operational and environmental requirements; and that the Project should be commended. He reiterated a caution on using heritage as a crutch.
4. Mr. Luther agreed with the comments on getting the Level 1 Requirements document signed and that the signature process "needs to be better".
5. Mr. Gay indicated the presentation was clean; he agreed with the risk assessment and was concerned about SBRS resources and the Maxwell processor. He also thanked Dr. Burg and his team for continuing to do good work, even during tough times. Recommended confirmation.
6. Mr. Napala : Recommended confirmation. He requested to see the calculations on the bus reliability. (Refer to Action Item 4.)

7. Mr. Scolese [through Dr. Hartman]: Mr. Scolese's biggest issue is with SBRS management controls. He wants Glory to watch not only that there are too few but too many resources. Recommended confirmation.
8. Dr. Kinney, Mr. Scolese, Dr. Hartman and Mr. Luther stressed that Headquarters must be kept very well informed with regard to SBRS. Dr. Hartman encouraged the Project to provide feedback - both positive and negative - through Center and Headquarters program management, as a means of supplying information constructive for future dialogue between NASA and Raytheon management.
9. Mr. Luther summarized the review, noted there were few action items, and re-emphasized the need to be pro-active with SBRS. Mr. Luther indicated he would recommend confirmation.

Appendix A.

Ed Weiler	GSFC 100	301-286-5121	eweiler@pop100.gsfc.nasa.gov
Chuck Gay	SMD ESSD	202-358-2387	cgay@nasa.gov
Colleen Hartman	SMD	202-358-2157	colleen.hartman@nasa.gov
Mike Luther	SMD	202-358-0260	mluther@nasa.gov
Kenneth W. Ledbetter	SMD/MSM	202-358-0486	kenneth.w.ledbetter@nasa.gov
Anne Kinney	SMD	202-358-2150	akinney@hq.nasa.gov
George Baker	SOMD	202-358-0607	george.d.baker@nasa.gov
Andy Dantzler	SMD/SSD	202-358-1024	andrew.dantzler@nasa.gov
Dolores Beasley	PAO	202-358-1753	dbeasley@nasa.gov
DeVon Carroll	OER	202-358-1622	devon.carroll@nasa.gov
Jaya Bajpayee	GSFC 420	301-286-2388	jaya.bajpayee@gsfc.nasa.gov
Nancy Porter	SMD BMD	202-358-0891	nporter@nasa.gov
Richard Ho	GSFC 301	301-286-6916	richard.ho-1@nasa.gov
Bernie Seery	GSFC 600	301 286-1170	bernie.seery@nasa.gov
David Scheve	GSFC 420	301-286-9694	david.m.scheve@nasa.gov
George Morrow	GSFC 400	301-286-3473	george.w.morrow@nasa.gov
Martha Maiden	HQ ESSO	202-358-1078	martha.e.maiden@nasa.gov
Lynn Westine	GSFC 420	301-286-4498	lwestine@pop400.gsfc.nasa.gov
Ron Hooker	SMD	202-358-4508	ron.hooker@nasa.gov
Tim Dunfee	GSFC 420	301-286-2568	timothy.l.dunfee@nasa.gov
Richard Burg	GSFC 420	301-286-7726	Richard.burg-1@nasa.gov
Michael Mishchenko	GSFC GISS	212-678-5590	crmim@giss.nasa.gov
Larry Travis	GSFC GISS	212-678-5599	ltravis@giss.nasa.gov
Hal Maring	NASA HQ	202-358-1679	hmaring@nasa.gov
Anne Sweet	NASA HQ	202-358-3784	anne.sweet-1@nasa.gov
Greg Williams	NASA HQ	202-358-0241	gregory.j.williams@nasa.gov
Chuck Miller	NASA HQ	202-358-0715	chuck.miller@nasa.gov
Willis Jenkins	NASA HQ	202-358-1285	willis.s.jenkins@nasa.gov
Garrett Skrobot	NASA KSC	321-867-5365	garrett.l.skrobot@nasa.gov
Carey Lively	GSFC 500	301-286-8983	carey.f.lively@nasa.gov
Chris Scolese	NASA OCE	202-358-1823	cscolese@nasa.gov
Patrick Martin	HQ OSMA	202-358-0417	patrick.martin@nasa.gov
Theodore Hammer	HQ ESSD	202-358-4767	theodore.f.hammer-1@nasa.gov
Phil Napala	HQ Safety	202-358-0564	phapala@hq.nasa.gov

Subject: RAO and ICE FW: GLORY Confirmation Review
Date: Thursday, November 3, 2005 9:19 AM
From: rhooker <ron.hooker@nasa.gov>
To: Edward.J.Weiler@nasa.gov, Mike Ryschkewitsch Michael.G.Ryschkewitsch@nasa.gov, Dave Scheve David.M.Scheve@nasa.gov, Richard Burg Richard.Burg-1@nasa.gov
Conversation: RAO and ICE FW: GLORY Confirmation Review

Gentlemen,

In preparation for next week's Glory CR, I am forwarding Headquarters assessment of both the GSFC RAO estimate and HQ's Independent Cost Estimate.
I am satisfied we are ready to proceed.

Best Regards,
Ron

--
Ron Hooker
Science Mission Directorate, NASA Headquarters
202 358-4508 office, 202 285-5199 cell

------ Forwarded Message
> From: Claude Freaner <claude.freaner@nasa.gov>
> Date: Tue, 1 Nov 2005 20:36:57 -0800
> To: rhooker <ron.hooker@nasa.gov>
> Subject: GLORY Confirmation Review
>
> Ron:
> I have reviewed the Project cost estimate and the independent
> estimate made by The Aerospace Corporation for GLORY. After
> Aerospace sent their first draft ICE to me, I forwarded it to the
> GLORY Project Manager for information. He wanted to better
> understand the ICE, so I requested that he and Aerospace get together
> and discuss the differences in cost for the various elements.
> Several iterations later, after the project was able to provide
> additional explanatory data and information, and Aerospace made
> adjustments to their ICE, we arrived at the current estimates. I
> would like to thank Richard Burg, GLORY Project Manager, and his team
> for their excellent cooperation and obvious desire to work with
> Aerospace to provide NASA Headquarters and Aerospace with Project
> data that helped us understand their Project and their cost estimate.
>
> The single largest difference between the Aerospace ICE and the
> Project estimate is the $6.8M for the APS instrument; Aerospace
> commented about their ICE: "Some of the APS analogies use contract
> costs instead of actual costs, so estimate could be somewhat low".
> Aerospace has also recommended that almost half of their total
> recommended reserves be applied to this one instrument due to the
> uncertainty in the estimate. The rest of the two estimates have
> insignificant differences that are well within the error of the
> estimate. The fact that the Project estimates are generally higher

> than the ICE for most individual elements tells me the Project
> estimate is conservative.
>
> I also reviewed the GSFC RAO assessment dated September 23, 2005, for
> the Mission Confirmation Readiness Review. Based on the GSFC RAO
> presentation of their cost estimating methodology on the WISE Project
> to NASA HQ on October 27, 2005, I find that the RAO estimate for
> GLORY, while higher than the Project estimate, does not appear to be
> a significant difference.
>
> I conclude that the GLORY Project cost estimate is a reasonable
> estimate for the mission described.
>
> Claude
>
> --
> Claude Freaner
> Mail Suite 5E39B
> Business Division, Science Mission Directorate
> NASA Headquarters
> Washington, DC 20546
> Office: 202-358-2522
> Fax: 202-358-2891
> Cellular: 202-744-5536
> claude.freaner@nasa.gov

------ End of Forwarded Message